The Correlation of Pupils of the Seventh Grade, First and Second Year of the High School--chronologically physically and mentally.

by

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Submitted to the Department of Education and the Faculty of the Graduate School of the University of Kansas in partial fulfillment of the requirements for the degree of Master of Science in Education

Approved by:

Department of Education

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(Signed) Harry H. Oldendick
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INTRODUCTION

In recent years the educational world has recognized the fallacy of grouping children in the schools without any regard as to their mental capacity or physical ability. In other words the pupils having mastered the work of one grade, with more or less credit, were promoted to the next grade. Perhaps in some cases where the student for some reason or other was retarded and his age was such as to make his advancement desirable, a kindly hearted teacher would leniently promote the individual, hoping thereby, either to help the individual or to rid herself of a nuisance.

Courses of study were organized for the average child, but as John Mason Tyler in his 'Growth in Education' points out "there is no average child." Hence, it was economically wrong to retard the precocious student to the speed of the ability of the student of average intellect and at the same time expect the weaker student to keep apace with the middle group.

In pursuance with this idea, the Mathematics department of the Central Senior High School, Kansas City, Missouri, adopted a plan, during the fall of 1920, which allowed for the differences

of ability of students. The method consisted in giving to all the sophomores, early in the year, The National Intelligence Tests Form A. The results of these tests together with the class grades in their Freshman mathematics classes were used in classifying the sophomores into three groups viz. Math.E. Math.M. Math.P., with the intention of doing more intensive work in the first group and less in the succeeding groups, with the understanding that all groups would cover the essentials of the course.

This scheme worked very satisfactorily and suggested to the writer the subject of the thesis: " The Correlation of the Seventh, First and Second Year of the High School--chronologically, physically and mentally." What relation should there be between the age in years, the physical development and the mental ability. It should be noted here that the seventh grade and the first year of high school are the two years or grades of the Central Junior High School and that the sophomore class of the high school is the first year of the Central Senior High School. Hence, the subject might well have been worded: " The Correlation of the two years of the Junior High School and the first year of the Senior High

School." The seventh grade is the highest grade of the elementary schools in Kansas City, Missouri, and pupils are given the option of attending the seventh grade in the district elementary school or the Junior High School, there being but one of the latter in 1920-1921.

Method of the Study

To find a solution for the problem the following data concerning each pupil was obtained: National Intelligence Tests (Form A) scores, the age, height and weight. In order to procure a rambling and fair sampling, it was decided to measure the students reporting to the English classes in the three grades. The Central Senior High School and the Central Junior High School occupy the same building, the former having five fifty minute recitation periods in the morning, the latter five fifty minute recitation periods in the afternoon. By using the English recitation periods it was felt that every student would be reached and in taking the tests the students would not be in unusual surroundings.

The cooperation of Mr. Otto Dubach, principal of the Central Senior High School and of Mr. Henry King, principal of the Central Junior High School, together with the hearty response of the faculties of both schools made the work of obtaining the information less difficult. The writer is aware that he caused numberless interruptions and possible annoyances, but care was taken throughout not to disturb, any more than

was necessary, the organization and progress of class-work.

The physical training department furnished the weights and the heights of the students reporting to their classes. Owing to the limited capacity of the gymnasium, due to over-crowded conditions, a large number of students did not take physical training. Hence it was necessry to have each of these students weighed and measured at times convenient. This was done under supervision by student assistants in the gymnasium classes.

All the information was recorded on cards shown on the following page. These cards were colored differently to facilitate the counting and distribution of the classes.

The cards were handed to the students who filled in the data above the double line. The Room and Recitation Hour (English) were filled in to aid in checking returns and to easily locate the individual if further information was desired. The birthplace of father and mother was requested to ascertain the influence of children of foreign parentage. Surprisingly, not many children descended from foreign parentage. It was supposed that profit would accrue from the record as to the school attended. Nothing definite was obtained

SEVENTH GRADE

Name ..... Boy or Girl .....
Last Name First

Grade ..... Room ..... Hour .....

Date of birth .....
Month, Day, Year

Birthplace of parents .....
Father Mother

Name of school attended before entering this school .....

Do not write below this line

Age .....

Height ..... Actual weight ..... Normal weight .....

Test	Method of Scoring	R	W	Score	E =	English
1	Rights X 2				M =	Mathematics
2	Rights X 2					
3	Rights					
4	Rights-Wrongs					
5	Rights X 0.3					
Total	Sum					

FRESHMAN

Name ..... Boy or Girl .....
Last Name First

Grade ..... Room ..... Hour .....

Date of birth .....
Month, Day, Year

Birthplace of parents .....
Father Mother

Name of school attended before entering this school .....

Do not write below this line

Age .....

Height ..... Actual weight ..... Normal weight .....

Test	Method of Scoring	R	W	Score	E =	English
1	Rights X 2				M =	Mathematics
2	Rights X 2					
3	Rights					
4	Rights-Wrongs					
5	Rights X 0.3					
Total	Sum					

SOPHOMORE

Name ..... Boy or Girl .....
Last Name First

Grade ..... Room ..... Hour .....

Date of birth .....
Month, Day, Year

Birthplace of parents .....
Father Mother

Name of school attended before entering this school .....

Do not write below this line

Age .....

Height ..... Actual weight ..... Normal weight .....

Test	Method of Scoring	R	W	Score	E =	English
1	Rights X 2				M =	Mathematics
2	Rights X 2					
3	Rights					
4	Rights-Wrongs					
5	Rights X 0.3					
Total	Sum					

from this information.

After the above data had been filled in by the students, the cards were returned to the writer. The ages were computed in years (as of September 1,1920) the heights and actual weights entered and the normal weight recorded. The normal weights were obtained from the chart prepared by Dr. Thomas D. Wood

Each Child to enter his own weight monthly

RIGHT HEIGHT and WEIGHT FOR BOYS

Height Inches	5 Yrs.	6 Yrs.	7 Yrs.	8 Yrs.	9 Yrs.	10 Yrs.	11 Yrs.	12 Yrs.	13 Yrs.	14 Yrs.	15 Yrs.	16 Yrs.	17 Yrs.	18 Yrs.
39	35	36	37											
40	37	38	39											
41	39	40	41											
42	41	42	43	44										
43	43	44	45	46										
44	45	46	46	47										
45	47	47	48	48	49									
46	48	49	50	50	51									
47	....	51	52	52	53	54								
48	....	53	54	55	55	56	57							
49	....	55	56	57	58	58	59							
50	....	....	58	59	60	60	61	62						
51	....	....	60	61	62	63	64	65						
52	....	....	62	63	64	65	67	68						
53	....	....	....	66	67	68	69	70	71					
54	....	....	....	69	70	71	72	73	74					
55	....	....	....	....	73	74	75	76	77	78				
56	....	....	....	....	77	78	79	80	81	82				
57	....	....	....	....	....	81	82	83	84	85	86			
58	....	....	....	....	....	84	85	86	87	88	90	91		
59	....	....	....	....	....	87	88	89	90	92	94	96	97	
60	....	....	....	....	....	91	92	93	94	97	99	101	102	
61	....	....	....	....	....	....	95	97	99	102	104	106	108	110
62	....	....	....	....	....	....	100	102	104	106	109	111	113	116
63	....	....	....	....	....	....	105	107	109	111	114	115	117	119
64	....	....	....	....	....	....	....	113	115	117	118	119	120	122
65	....	....	....	....	....	....	....	....	120	122	123	124	125	126
66	....	....	....	....	....	....	....	....	125	126	127	128	129	130
67	....	....	....	....	....	....	....	....	130	131	132	133	134	135
68	....	....	....	....	....	....	....	....	134	135	136	137	138	139
69	....	....	....	....	....	....	....	....	138	139	140	141	142	143
70	....	....	....	....	....	....	....	....	....	142	144	145	146	147
71	....	....	....	....	....	....	....	....	....	147	149	150	151	152
72	....	....	....	....	....	....	....	....	....	152	154	155	156	157
73	....	....	....	....	....	....	....	....	....	157	159	160	161	162
74	....	....	....	....	....	....	....	....	....	162	164	165	166	167
75	....	....	....	....	....	....	....	....	....	....	169	170	171	172
76	....	....	....	....	....	....	....	....	....	....	174	175	176	177

Health in Education
Education in Health

Prepared by Dr. Thomas D. Wood

ABOUT WHAT A BOY SHOULD GAIN EACH MONTH

AGE	
5 to 8	6 oz.
8 to 12	8 oz.
12 to 14	12 oz.
14 to 16	16 oz.
16 to 18	8 oz.

ABOUT WHAT A GIRL SHOULD GAIN EACH MONTH

AGE	
5 to 8	6 oz.
8 to 11	8 oz.
11 to 14	12 oz.
14 to 16	8 oz.
16 to 18	4 oz.

RIGHT HEIGHT and WEIGHT FOR GIRLS

Height Inches	5 Yrs.	6 Yrs.	7 Yrs.	8 Yrs.	9 Yrs.	10 Yrs.	11 Yrs.	12 Yrs.	13 Yrs.	14 Yrs.	15 Yrs.	16 Yrs.	17 Yrs.	18 Yrs.
39	34	35	36											
40	36	37	38											
41	38	39	40											
42	40	41	42	43										
43	42	42	43	44										
44	44	45	45	46										
45	46	47	47	48	49									
46	48	48	49	50	51									
47	....	49	50	51	52	53								
48	....	51	52	53	54	55	56							
49	....	53	54	55	56	57	58							
50	....	....	56	57	58	59	60	61						
51	....	....	59	60	61	62	63	64						
52	....	....	62	63	64	65	66	67						
53	....	....	....	66	67	68	68	69	70					
54	....	....	....	68	69	70	71	72	73					
55	....	....	....	....	72	73	74	75	76	77				
56	....	....	....	....	76	77	78	79	80	81				
57	....	....	....	....	....	81	82	83	84	85	86			
58	....	....	....	....	....	85	86	87	88	89	90	91		
59	....	....	....	....	....	89	90	91	93	94	95	96	98	
60	....	....	....	....	....	....	94	95	97	99	100	102	104	106
61	....	....	....	....	....	....	99	101	102	104	106	108	109	111
62	....	....	....	....	....	....	104	106	107	109	111	113	114	115
63	....	....	....	....	....	....	109	111	112	113	115	117	118	119
64	....	....	....	....	....	....	....	115	117	118	119	120	121	122
65	....	....	....	....	....	....	....	117	119	120	122	123	124	125
66	....	....	....	....	....	....	....	119	121	123	124	126	127	128
67	....	....	....	....	....	....	....	....	124	125	127	128	129	130
68	....	....	....	....	....	....	....	....	126	128	130	132	133	134
69	....	....	....	....	....	....	....	....	129	131	133	135	136	137
70	....	....	....	....	....	....	....	....	....	134	136	138	139	140
71	....	....	....	....	....	....	....	....	....	138	140	142	143	144
72	....	....	....	....	....	....	....	....	....	....	145	147	148	149

Health in Education
Education in Health

Prepared by Dr. Thomas D. Wood.

Height and weight should be taken, without shoes, in only the usual indoor clothes, and on the same day each month.

CHILD HEALTH ORGANIZATION, 156 Fifth Avenue, New York

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The overweights and underweights were determined according to the prevailing practice in the elementary schools, that is, if a child weighed more than ten percent in excess of the normal weight, he is considered an overweight.

The results of the intelligence scores were recorded in detail i.e. the result of each test was shown rather than the total, for the reason that the English and the Mathematics Departments planned to use the results of the individual tests in classifying the students of their respective departments. In the open space, provision was made for information that might be desirable for the departments of English and Mathematics. This had no bearing on the solution of the problem of this thesis. It should be noted that these cards and the records thereon were to serve the dual purpose of recording informational data for this thesis and to afford the high school executives data for the arrangement of student groups.

After this material had been gathered and recorded on the cards, distributions were made on large sheets, grouping for example all the students of the same class, the same age and intelligence scores. With this as a basis the tables and schedules that appear later in the discussion were evolved. Owing to the wide range of the intelligence scores, it was found

expedient to group these scores into class intervals of ten, for example 120-129, 130-139 etc.

The total of the six groups numbers 1520 Pupils.

The Chronological Ages

Table I shows the classification of boys and girls in each class arranged by classes and ages only. The ages range from 11years in the Seven-A class to 20 years in the sophomore class. The individual in the sophomore class aged 20 years is a Philippino. It may be criticized that he was included in the study. He was in the school, a protege of the national government, a resident of the school district and a bona fide pupil of the school. Central High School is located in the central part of the city and is patronized by a representative group of American school students. Hence, what may be said of this large group might equally hold for any other group of high school students elsewhere. The table is informational; it shows the distribution by ages and the trend upwards in the higher grades, as was expected.

Table I

Pupils Enrolled in the Central Junior High School and the Sophomore Class of the Central Senior High School 1920-1921, who were included in this study.

	Junior High School						Senior H.S.					
	Seven-A			Freshman			Sophomore			Totals		
	B	G	T	B	G	T	B	G	T	B	G	T
Age Years												
11	18	15	33							18	15	33
12	42	64	106	29	36	65	3	1	4	74	101	175
13	42	57	99	96	158	254	21	20	41	159	235	394
14	21	16	37	112	147	259	74	88	162	207	251	458
15	12	11	23	61	63	124	64	108	172	137	182	319
16	2	-	2	18	17	35	38	39	77	58	56	114
17				6	4	10	10	4	14	16	8	24
18				1	-	1	-	1	1	1	1	2
19										-	-	-
20							*1	-	1	1	-	1
Total Boys	137			323			211			671		
Girls		163			425			261			849	
Total			300			748			472			1520

* Philippino

The Distribution Tables

In the tables which follow are shown the distribution of the classes, boys and girls separately, according to age and intelligence scores. The overweights and the underweights are also indicated. It should be remembered that all students who weighed ten per cent or more above the normal weight were classed as overweights and those students who weighed ten per cent or less than the normal weight were classed as underweights. The footnote under Table II explains how the distribution tables are to be read. Each of the tables are complete in that all facts of the study concerning each class are shown.

Table II Showing the Distribution of Age and Intelligence Scores for the Seven-A Boys

Intelligence Scores	Age 11	12	13	14	15	16	Totals
180-189	-	-	*1 1	-	-	-	*1 1
170-179	2	*3 6 #2	1	-	*1 2	-	*4 11 #2
160-169	3 #1	*1 4	*1 4 #1	1	1	-	*2 13 #2
150-159	*1 3	8 #1	6	*1 4 #1	1	-	*2 22 #2
140-149	*3 3	*3 8	3	3 #1	1	-	*6 18 #1
130-139	2	*2 9	*3 9	*1 6	1	-	*6 27
120-129	2	*1 5 #1	10 #1	*1 5	3	2	*2 27 #2
110-119	2	1	5	1	*1 2 #1	-	*1 11 #1
100-109	1	*1 1	*1 2	-	1	-	*2 5
90- 99	-	-	*1 1	1	-	-	*1 2
Totals	*4 18 #1	*11 42 #4	*7 42 #2	*3 21 #2	*2 12 #1	2	*27 137 #10

Note:-This table should be read as follows: Of the number making an intelligence score of 160-169, there were three 11 years old one of whom was underweight; four were 12 years of age one of whom was overweight; four were 13 years of age one of whom was overweight and another was underweight; one was 14 years old and another 15 years of age.

* Overweights # Underweights

Table III Showing the Distribution of Age and Intelligence Scores for the Seven-A Girls

Intelligence Scores	Age 11	12	13	14	15	Total
170-179	1	*2 5	3 #1	-	-	*2 9 #1
160-169	*1 5 #1	*1 11 #3	*2 6 #1	-	-	*4 22 #5
150-159	1 #1	*2 8 #4	*1 8	*1 4 #1	*1 1	*5 22 #6
140-149	5	*3 18 #2	13 #1	*2 2	3 #1	*5 41 #4
130-139	3 #2	*1 10 #2	*1 6 #2	1	2	*2 22 #6
120-129	-	7 #3	*1 7 #2	5 #3	*2 3	*3 22 #8
110-119	-	*1 3	8 #4	3	-	*1 14 #4
100-109	-	2	5 #2	1	2	10 #2
90- 99	-	-	1 #1	-	-	1 #1
Totals	*1 15 #4	*10 64 #14	*5 57 #14	*3 16 #4	*3 11 #1	*22. 163 #37

* Overweights # Underweights

Note: See explanation under Table II

Table IV Showing the Distribution of Age and Intelligence Scores for the Freshman Boys

Intelligence Scores	Age 12	13	14	15	16	17	18	Totals
180-189	-	*1 6	*1 4 #1	1	1	1	-	*2 13 #1
170-179	2	*4 14	*1 3	*1 1	1	-	--	*6 21
160-169	*1 5	*4 21 #3	*1 18 #3	*1 8 #2	3	1	-	*7 56 #8
150-159	8	*3 21 #4	*3 29 #6	*2 10	3 #1	-	-	*8 71 #11
140-149	6	*2 17	*3 30 #3	*5 18 #2	*1 4	3 #1	-	*11 78 #6
130-139	*1 2	*1 8 #1	*3 16 #2	*1 11 #1	*1 1	-	1	*7 39 #4
120-129	3	6	8 #2	3 #1	5	-	-	25 #3
110-119	2	3	*2 3	6 #1	-	-	-	*2 14 #1
100-109	*1 1	-	*1 1	2 #1	-	1	-	*2 5 #1
90- 99	-	-	-	-	-	-	-	-
80- 89	-	-	-	1	-	-	-	1
Totals	*3 29	*15 96 #8	*15 112 #17	*10 61 #8	*2 18 #1	6 #1	1	*45 323

* Overweights # Underweights

Note: See explanation under Table II

Table V Showing the Distribution of Age and Intelligence Scores for the Freshman Girls

Intelligence Scores	Age 12	13	14	15	16	17	Totals
180-189	-	5 #2	1	-	-	-	6 #2
170-179	*1 5 #2	*3 28 #9	*1 12 #5	-	-	-	*5 45 #16
160-169	*2 8 #1	*3 30 #9	*6 28 #8	*1 7 #2	*1 6 #1	1	*13 80 #21
150-159	*2 10 #5	*6 32 #9	*3 35 #8	*4 15 #3	2	1	*15 95 #25
140-149	*1 8 #5	*2 31 #8	*3 32 #6	*2 14 #7	5 #1	1	*8 91 #27
130-139	*1 5	*5 19 #1	*1 26 #6	*2 15 #5	4 #1	-	*9 69 #13
120-129	-	*3 10 #3	*2 7 #1	*1 7 #2	-	-	*6 24 #6
110-119	-	*1 1	6 #1	4 #1	-	-	*1 11 #2
100-109	-	*1 1	-	*1 1	-	1	*2 3
90- 99	-	1	-	-	-	-	1
Totals	*7 36 #13	*24 158 #41	*16 147 #35	*11 63 #20	*1 17 #3	4	*59 425 #112

* Overweights # Underweights

Note: See explanation under Table II

Table VI Showing the Distribution of Age and Intelligence Scores for the Sophomore Boys

Intelligence Scores	Age 12	13	14	15	16	17	20	Totals
180-189	1	-	3	*2 6 #1	-	-	-	*2 10 #1
170-179	1	2	*2 14 #2	11 #2	1	1	-	*2 30 #4
160-169	-	*1 6	*1 19 #7	*2 18 #3	5 #1	1	-	*4 49 #11
150-159	-	*1 7	14 #1	15 #1	*1 8 #2	-	-	*2 44 #4
140-149	-	*1 4	*2 16 #2	*3 10 #1	*2 12 #1	1	-	*8 43 #4
130-139	1	1	*1 5	*1 4 #1	6 #1	*1 3	-	*3 20 #2
120-129	-	1 #1	*1 2	-	3 #1	3	-	*1 9 #2
110-119	-	-	1	-	3 #1	1	-	5 #1
100-109	-	-	-	-	-	-	1	1
Totals	3	*3 21 #1	*7 74 #12	*8 64 #9	*3 38 #7	*1 10	1	*22 211 #29

*Overweights # Underweights

Note: See explanation under Table II

Table VII Showing the Distribution of Age and Intelligence Scores for the Sophomore Girls

Intelligence Scores	Age 12	13	14	15	16	17	18	Totals
190-196	-	-	-	1 #1	-	-	-	1 #1
180-189	-	1	3 #1	*1 3 #1	1	-	-	*1 8 #2
170-179	-	*2 4 #2	*3 15 #1	*3 23 #6	7 #1	-	-	*8 49 #10
160-169	-	*2 5 #1	*2 27 #5	*5 27 #4	*1 8 #3	-	-	*10 67 #13
150-159	1 #1	*1 8 #2	*9 24 #5	*4 18 #4	*2 6	*1 1	-	*17 58 #12
140-149	-	1	*6 15 #2	*1 17 #8	*2 8	2 #1	1	*9 44 #11
130-139	-	1	*1 3 #1	*1 10	*3 8 #1	1	-	*5 23 #2
120-129	-	-	1	*5 7 #2	-	-	-	*5 8 #2
110-119	-	-	-	2	-	-	-	2
100-109	-	-	-	-	1	-	-	1
Totals	1 #1	*5 20 #5	*21 88 #15	*20 108 #26	*8 39 #5	*1 4 #1	1	*55 261 #53

* Overweights # Underweights

Note: See explanation under Table II

Overweights and Underweights

In the tables that follow are shown for each class, boys and girls separately, the number of overweights and underweights with the age of each and the intelligence scores. Three phases of the study are exhibited viz. abnormal weight, age and intelligence scores. The percentages are shown with the totals, to aid in making comparisons.

It should be remembered that ten per cent or more above the normal weight and ten per cent or more below the normal weight was considered as overweight and underweight respectively.

These percentages are gathered together in the Tables XIV and XV from which some interesting facts are obtained. The overweights and underweights that are of the same age as the median or average age of the class or who have made an intelligence score equal to the median or average intelligence score of the class are indicated. At a glance it will be seen that both the overweights and the underweights range usually below the average age and above the average intelligence score. It is well to refer to the Summary Table, before coming to any definite conclusions.

The tables are not intricate and require but little explanation.

Table VIIIa Showing the Overweights-Intelligence Scores-Age of the Seven-A Boys, as well as Percentage Comparisons

	Intelligence Scores 90-99	100-109	110-119	120-129	130-139	140-149	150-159	160-169	170-179	180-189	Total	%
Age 15	-	-	1	-	-	-	-	-	1	-	2	7
14	-	-	-	1	1	-	1	-	-	-	3	11
13	1	1	-	-	3	-	-	1	-	1	7	26
12	-	1	-	1	2	3	-	1	3	-	11	41
11	-	-	-	-	-	3	1	-	-	-	4	15
Total	1	2	1	2	6	6	2	2	4	1	27	
%	4	7	4	7	22	23	7	7	15	4		

Table VIIIb Showing the Underweights-Intelligence Scores-Age of the Seven-A Boys, as well as Percentage Comparisons

	Intelligence Scores 90-99	100-109	110-119	120-129	130-139	140-149	150-159	160-169	170-179	180-189	Total	%
Age 15	-	-	1	-	-	-	-	-	-	-	1	10
14	-	-	-	-	-	1	1	-	-	-	2	20
13	-	-	-	1	-	-	-	1	-	-	2	20
12	-	-	-	1	-	-	1	-	2	-	4	40
11	-	-	-	-	-	-	-	1	-	-	1	10
Total	-	-	1	2	-	1	2	2	2	-	10	
%			10	20		10	20	20	20			

Note: The comparison percentages are indicated to the right of the total for each age and below the total for each intelligence score. The table reads as follows: Of the Seven-A Boys who were overweight and age 15, one made a score of 110-119, another made a score of 170-179, making a total of two 15 year old overweights or seven per cent of the Seven-A Boys who were overweight.

Table IXa Showing the Overweights-Intelligence Scores-Age of the Seven-A Girls, as well as Percentage Comparisons

	Intelligence Scores 90-99	100-109	110-119	120-129	130-139	140-149	150-159	160-169	170-179	Total	%
Age 15	-	-	-	2	-	-	1	-	-	3	14
14	-	-	-	-	-	2	1	-	-	3	14
13	-	-	-	1	1	-	1	2	-	5	23
12	-	-	1	-	1	3	2	1	2	10	45
11	-	-	-	-	-	-	-	1	-	1	4
Total	-	-	1	3	2	5	5	4	2	22	
%			4	13	9	23	23	18	9		

Table IXb Showing the Overweights-Intelligence Scores-Age of the Seven-A Girls, as well as Percentage Comparisons

	Intelligence Scores 90-99	100-109	110-119	120-129	130-139	140-149	150-159	160-169	170-179	Total	%
Age 15	-	-	-	-	-	1	-	-	-	1	3
14	-	-	-	3	-	-	1	-	-	4	11
13	1	2	4	2	2	1	-	1	1	14	38
12	-	-	-	3	2	2	4	3	-	14	37
11	-	-	-	-	2	-	1	1	-	4	11
Total	1	2	4	8	6	4	6	5	1	37	
%	3	5	11	21	16	11	16	14	3		

Note: See explanation below Table VIII

Table Xa Showing the Overweights-Intelligence Scores-Age of the Freshman Boys, also Percentage Comparisons

	Intelligence Scores 100-109	110-119	120-129	130-139	140-149	150-159	160-169	170-179	180-189	Total	%
Age 16	-	-	-	1	1	-	-	-	-	2	4
15	-	-	-	1	5	2	1	1	-	10	22
14	1	2	-	3	3	3	1	1	1	15	33
13	-	-	-	1	2	3	4	4	1	15	34
12	1	-	-	1	-	-	1	-	-	3	7
Total	2	2	-	7	11	8	7	6	2	45	
%	4	4		16	25	18	16	13	4		

Table Xb Showing the Underweights-Intelligence Scores-Age of the Freshman Boys, also Percentage Comparisons

	Intelligence Scores 100-109	110-119	120-129	130-139	140-149	150-159	160-169	170-179	180-189	Total	%
Age 17	-	-	-	-	1	-	-	-	-	1	3
16	-	-	-	-	-	1	-	-	-	1	3
15	1	1	1	1	2	-	2	-	-	8	23
14	-	-	2	2	3	6	3	-	1	17	48
13	-	-	-	1	-	4	3	-	-	8	23
Total	1	1	3	4	6	11	8	-	1	35	
%	3	3	9	11	17	31	23		3		

Note: See explanation under Table VIII

Table XIa Showing the Overweights-Intelligence Scores-Age of the Freshman Girls, also Percentage Comparisons

	Intelligence Scores 100-109	110-119	120-129	130-139	140-149	150-159	160-169	170-179	180-189	Total	%
Age 16	-	-	-	-	-	-	1	-	-	1	1
15	1	-	1	2	2	4	1	-	-	11	19
14	-	-	2	1	3	3	6	1	-	16	27
13	1	1	3	5	2	6	3	3	-	24	41
12	-	-	-	1	1	2	2	1	-	7	12
Total	2	1	6	9	8	15	13	5	-	59	
%	3	2	10	15	13	26	22	9			

Table XIb Showing the Underweights-Intelligence Scores-Age of the Freshman Girls, also Percentage Comparisons

	Intelligence Scores 100-109	110-119	120-129	130-139	140-149	150-159	160-169	170-179	180-189	Total	%
Age 16	-	-	-	1	1	-	1	-	-	3	3
15	-	1	2	5	7	3	2	-	-	20	17
14	-	1	1	6	6	8	8	5	-	35	31
13	-	-	3	1	8	9	9	9	2	41	37
12	-	-	-	-	5	5	1	2	-	13	12
Total	-	2	6	13	27	25	21	16	2	112	
%		2	5	12	24	22	19	14	2		

Note: See explanation under Table VIII

Table XIIa Showing the Overweights-Intelligence Scores-Age of the Sophomore Boys, also Percentage Comparisons

	Intelligence Scores 110-119	120-129	130-139	140-149	150-159	160-169	170-179	180-189	Total	%
Age 17	-	-	1	-	-	-	-	-	1	5
16	-	-	-	2	1	-	-	-	3	14
15	-	-	1	3	-	2	-	2	8	36
14	-	1	1	2	-	1	2	-	7	31
13	-	-	-	1	1	1	-	-	3	14
Total	-	1	3	8	2	4	2	2	22	
%		5	14	36	9	18	9	9		

Table XIIb Showing the Underweights-Intelligence Scores-Age of the Sophomore Boys, also Percentage Comparisons

	Intelligence Scores 110-119	120-129	130-139	140-149	150-159	160-169	170-179	180-189	Total	%
Age 16	1	1	1	1	2	1	-	-	7	24
15	-	-	1	1	1	3	2	1	9	31
14	-	-	-	2	1	7	2	-	12	42
13	-	1	-	-	-	-	-	-	1	3
Total	1	2	2	4	4	11	4	1	29	
%	3	7	7	14	14	38	14	3		

Note: See explanation under Table VIII

Table XIIIa Showing the Overweights-Intelligence Scores-Age of the Sophomore Girls, also Percentage Comparisons

	Intelligence Scores 120-129	130-139	140-149	150-159	160-169	170-179	180-189	190-199	Total	%
Age 17	-	-	-	1	-	-	-	-	1	2
16	-	3	2	2	1	-	-	-	8	15
15	5	1	1	4	5	3	1	-	20	36
14	-	1	6	9	2	3	-	-	21	38
13	-	-	-	1	2	2	-	-	5	9
Total	5	5	9	17	10	8	1	-	55	
%	9	9	16	31	18	15	2			

Table XIIIb Showing the Underweights-Intelligence Scores-Age of the Sophomore Girls, also Percentage Comparisons

	Intelligence Scores 120-129	130-139	140-149	150-159	160-169	170-179	180-189	190-196	Total	%
Age 17	-	-	1	-	-	-	-	-	1	2
16	-	1	-	-	3	1	-	-	5	9
15	2	-	8	4	4	6	1	1	26	50
14	-	1	2	5	5	1	1	-	15	28
13	-	-	-	2	1	2	-	-	5	9
12	-	-	-	1	-	-	-	-	1	2
Total	2	2	11	12	13	10	2	1	53	
%	4	4	21	22	24	19	4	2		

Note: See explanation under Table VIII

Directions for interpreting Tables XIV and XV

The percentage figures inclosed by a rectangle indicate that such a per cent of the overweights or underweights made an intelligence score equal to the median or average intelligence score of their respective classes, or the age of the per cent of overweights or underweights was equal to the median or average age of their respective classes. Example: In Table XIVa 22% of the overweight Seven-A Boys made an intelligence score of 130-139, the median of the class Seven-A Boys. All the figures in the table represent percentages of the total overweight or underweight of the class and not of the total of all belonging to the class.

Table XIVa Showing the Percentage Comparisons Overweight-Intelligence Scores

	Per Cent of Overweights					
	Seven-A		Freshman		Sophomore	
	Boys	Girls	Boys	Girls	Boys	Girls
Intelligence Scores						
180-189	4	-	4	-	9	2
170-179	15	9	13	9	9	-
160-169	7	18	16	22	18	15
150-159	7	23	18	26	9	18
140-149	23	24	25	13	36	31
130-139	22	9	16	15	14	16
120-129	7	13	-	10	5	9
110-119	4	4	4	2	-	9
100-109	7	-	4	3	-	-
90- 99	4	-	-	-	-	-

Table XIVb Showing the Percentage Comparisons of the Overweight-Age

	Per Cent of Overweights					
	Seven-A		Freshman		Sophomore	
	Boys	Girls	Boys	Girls	Boys	Girls
Age						
17	-	-	-	-	5	2
16	-	-	4	1	14	15
15	7	14	22	19	36	36
14	11	14	33	27	31	38
13	26	23	34	41	14	9
12	41	45	7	12	-	-
11	15	4	-	-	-	-

Table XVa Showing the Percentage Comparisons of the Underweight-Intelligence Scores

	Per Cent of Underweights					
	Seven-A		Freshman		Sophomore	
	Boys	Girls	Boys	Girls	Boys	Girls
Intelligence Scores						
190-196	-	-	-	-	-	2
180-189	-	-	3	2	3	4
170-179	20	3	-	14	14	19
160-169	20	14	23	19	38	24
150-159	20	16	31	22	14	22
140-149	10	11	17	24	14	21
130-139	-	16	11	12	-	-
120-129	20	21	9	5	-	-
110-119	10	11	3	2	-	-
100-109	-	5	3	-	-	-
90- 99	-	3	-	-	-	-

Table XVb Showing the Percentage Comparisons of the Underweight-Age

	Per Cent of Underweights					
	Seven-A		Freshman		Sophomore	
	Boys	Girls	Boys	Girls	Boys	Girls
Age						
17	-	-	3	-	-	2
16	-	-	3	3	24	9
15	10	3	23	17	31	50
14	20	11	48	31	42	28
13	20	38	23	37	3	9
12	40	37	-	12	-	2
11	10	11	-	-	-	-

The Age-Intelligence Correlations

The correlation of age and intelligence scores for each class of boys and girls separately is shown in the tables that follow. The method used to determine the correlations was that outlined by H.O.Rugg in his book, 'Statistical Methods Applied to Education' Chapter IX, 'The Measurement of Relationships' pages 260-272.

In addition to the correlations other information is shown on the tables viz. the standard deviations, the medians and percentiles for the intelligence scores and the age of the individuals.

The results of these tables as well as of the previous tables, have been assembled in the final table= The Summary, Table XXII. This final table gives the perspective of the whole situation and warrants the conclusions. All the other tables are substantiating compilations.

Some Results of the National Intelligence Tests

The National Intelligence Tests are comparatively new and the results thus far obtained have not fully justified the establishment of Intelligent Quotients. It is a safe supposition however, that the middle fifty per cent of the individuals of this study and classified by the National Intelligence Tests, would not react very materially differently if subjected to any other intelligence test.

The Bureau of Research and Efficiency, Kansas City, Missouri, under the direction of Mr. George Melcher, applied the National Intelligence Tests to 3730 pupils in the kansas City, Missouri schools and obtained the following norms of age-intelligence scores.

	Age in years							
	11	12	13	14	15	16	17	
10 Percentile	68	91	107	112	117	117	120	
25 "	85	111	126	128	132	131	130	
Median	109	131	140	143	148	145	143	
75 Percentile	130	148	154	157	160	158	156	
90 "	146	159	167	168	170	167	168	
Number of Pupils	309	577	908	1000	622	237	77	3730

Table XVI Showing the Correlation of Age-Intelligence Scores of the Seven-A Boys

Intelligence Scores	Age in Years						Total
	11	12	13	14	15	16	
180-189	-	-	1	-	-	-	1
170-179	2	6	1	-	2	-	11
160-169	3	4	4	1	1	-	13
150-159	3	8	6	4	1	-	22
140-149	3	8	3	3	1	-	18
130-139	2	9	9	6	1	-	27
120-129	2	5	10	5	3	2	27
110-119	2	1	5	1	2	-	11
100-109	1	1	2	-	1	-	5
90- 99	-	-	1	1	-	-	2
Total	18	42	42	21	12	2	137

Correlation= r= -.24

	Age	Intelligence Scores
10 Percentile	11.76	116.1
25 Percentile	12.39	126.0
Median	13.20	138.7
75 Percentile	14.30	151.2
90 Percentile	15.25	161.0
Standard Deviation	1.2	19.8

Table XVII Showing the Correlation of Age-Intelligence Scores of the Seven-A Girls

Intelligence Scores	Age in Years					Total
	11	12	13	14	15	
170-179	1	5	3	-	-	9
160-169	5	11	6	-	-	22
150-159	1	8	8	4	1	22
140-149	5	18	13	2	3	41
130-139	3	10	6	1	2	22
120-129	-	7	7	5	3	22
110-119	-	3	8	3	-	14
100-109	-	2	5	1	2	10
90- 99	-	-	1	-	-	1
Total	15	64	57	16	11	163

Correlation= r= -.24

	Age	Intelligence Scores
10 Percentile	12.08	113.1
25 Percentile	12.40	127.2
Median	13.15	143.1
75 Percentile	13.27	155.6
90 Percentile	14.67	166.7
Standard Deviation	1.0	19.0

Table XVIII Showing the Correlation of Age-Intelligence Scores of the Freshman Boys

Intelligence Scores	Age in Years							
	12	13	14	15	16	17	18	Total
180-189	-	6	4	1	1	1	-	13
170-179	2	14	3	1	1	-	-	21
160-169	5	21	18	8	3	1	-	56
150-159	8	21	29	10	3	-	-	71
140-149	6	17	30	18	4	3	-	78
130-139	2	8	16	11	1	-	1	39
120-129	3	6	8	3	5	-	-	25
110-119	2	3	3	6	-	-	-	14
100-109	1	-	1	2	-	1	-	5
90-99	-	-	-	-	-	-	-	-
80-89	-	-	-	1	-	-	-	1
Total	29	96	112	61	18	6	1	323

Correlation= r= -.19

	Age	Intelligence Scores
10 Percentile	13.03	124.9
25 Percentile	13.54	139.0
Median	14.32	149.9
75 Percentile	14.96	161.7
90 Percentile	15.88	170.8
Standard Deviation	1.1	17.7

Table XIX Showing the Correlation of Age-Intelligence Scores of the Freshman Girls

Intelligence Scores	Age in Years						Total
	12	13	14	15	16	17	
180-189	-	5	1	-	-	-	6
170-179	5	28	12	-	-	-	45
160-169	8	30	28	7	6	1	80
150-159	10	32	35	15	2	1	95
140-149	8	31	32	14	5	1	91
130-139	5	19	26	15	4	-	69
120-129	-	10	7	7	-	-	24
110-119	-	1	6	4	-	-	11
100-109	-	1	-	1	-	1	3
90- 99	-	1	-	-	-	-	1
Total	36	158	147	63	17	4	425

Correlation= r= -.15

	Age	Intelligence Scores
10 Percentile	13.04	130.5
25 Percentile	13.48	139.5
Median	14.12	150.4
75 Percentile	14.85	163.1
90 Percentile	15.66	170.9
Standard Deviation	1.0	16.1

Table XX Showing the Correlation of Age-Intelligence Scores of the Sophomore Boys

Intelligence Scores	Age in Years							
	12	13	14	15	16	17	20	Total
180-189	1	-	3	6	-	-	-	10
170-179	1	2	14	11	1	1	-	30
160-169	-	6	19	18	5	1	-	49
150-159	-	7	14	15	8	-	-	44
140-149	-	4	16	10	12	1	-	43
130-139	1	1	5	4	6	3	-	20
120-129	-	1	2	-	3	3	-	9
110-119	-	-	1	-	3	1	-	5
100-109	-	-	-	-	-	-	1	1
Total	3	21	74	64	38	10	1	211

Correlation= r= -.33

	Age	Intelligence Scores
10 Percentile	13.86	133.1
25 Percentile	14.39	144.1
Median	15.12	156.3
75 Percentile	15.94	167.3
90 Percentile	16.73	176.0
Standard Deviation	1.13	16.4

Table XXI Showing the Correlation of Age-Intelligence Scores of the Sophomore Girls

Intelligence Scores	Age in Years							
	12	13	14	15	16	17	18	Total
190-196	-	-	-	1	-	-	-	1
180-189	-	1	3	3	1	-	-	8
170-179	-	4	15	23	7	-	-	49
160-169	-	5	27	27	8	-	-	67
150-159	1	8	24	18	6	1	-	58
140-149	-	1	15	17	8	2	1	44
130-139	-	1	3	10	8	1	-	23
120-129	-	-	1	7	-	-	-	8
110-119	-	-	-	2	-	-	-	2
100-109	-	-	-	-	1	-	-	1
Total	1	20	88	108	39	4	1	261

Correlation= r= -.23

	Age	Intelligence Scores
10 Percentile	14.06	136.6
25 Percentile	14.50	147.1
Median	15.20	159.1
75 Percentile	15.80	168.9
90 Percentile	16.46	176.5
Standard Deviation	.91	15.0

Summary

The summary table XXIII Part 1 and 2 is the collection of data presented in all the previous tables in condensed form to facilitate the comparisons necessary for adequate judgment and to arrive at conclusions. It gives the reader a perspective of the results of the study in ensemble. While the summary table is rather self-explanatory, it is well that a few words of explanation be added.

1. The total number of each class, boys and girls separately, is shown.

2. Chronological Age: The range, percentiles and medians are expressed in years. The standard deviations are indicated also.

3. Intelligence Scores: The median intelligence score indicates the highest score made by any one of the lower half of the group and so on for the percentiles. For example, Seven-A Boys reads 75 percentile 151.2 means that the highest score made by any one of the 75% of the boys in the Seven-A group was 151.2

From the table we see that the middle fifty per cent of the Freshman Girls made scores ranging from 139.5 (25 Percentile) to 163.1 (75 Percentile). Instead of the 25 Percentile and 75 Percentile some statisticians use First Quartile and Third Quartile respectively.

3. Normal Weights: The first line shows the total number of students of the class who are of normal weight, the line following the percentage relation to the entire class.

The following schedules show the percentage comparisons of the normal weights to the group of the class who are of the median or average age of the entire class. The same comparison is made in reference to the group of the class who made the median or average intelligence scores of the entire class.

What has been said of the Normal Weights will apply also to the Overweights and to the Underweights.

Note: See definition for Overweights and underweights, page 22.

Table XXIII (Part 1)

THE SUMMARY

	Seven-A		Freshman		Sophomore	
	Boys	Girls	Boys	Girls	Boys	Girls
Number in each Class	137	163	323	425	211	261
AGE						
Range in years	11-16	11-16	12-18	12-17	12-20	13-18
10 Percentile	11.76	12.08	13.03	13.04	13.86	14.06
25 Percentile	12.39	12.40	13.54	13.48	14.39	14.50
Median	13.20	13.15	14.32	14.12	15.12	15.20
75 Percentile	14.30	13.27	14.96	14.85	15.94	15.80
90 Percentile	15.25	14.67	15.88	15.66	16.73	16.46
Standard Deviation	1.2	1.0	1.1	1.0	1.13	.91
INTELLIGENCE SCORES						
Range	92-182	93-176	80-189	96-189	103-185	101-190
10 Percentile	116.1	113.1	124.9	130.5	133.1	136.6
25 Percentile	126.0	127.2	139.0	139.5	144.1	147.1
Median	138.7	143.1	149.9	150.4	156.3	159.1
75 Percentile	151.2	155.6	161.7	163.1	167.3	168.9
90 Percentile	161.0	166.7	170.8	170.9	176.0	176.5
Standard Deviation	19.8	19.0	17.7	16.1	16.4	15.0
CORRELATIONS						
Age-Intelligence Scores	-.24	-.24	-.19	-.15	-.33	-.23

Table XXIII (Part 2)

THE SUMMARY

	Seven-A		Freshman		Sophomore		Total
	Boys	Girls	Boys	Girls	Boys	Girls	
Number in each Class	137	163	323	425	211	261	1520
NORMAL WEIGHTS							
Total number	100	104	243	254	160	153	1014
Percentage of entire class	73.0	63.8	75.3	59.7	75.8	58.6	66.7
Per cent							
Above av. age	27	48	26	19	23	19	22
Average age	33	37	33	38	30	41	35
Below av. age	40	15	41	43	47	40	43
Per cent							
Above av.intell.	43	29	49	29	40	52	41
Av.intelligence	21	31	25	22	24	19	23
Below av.intell.	36	40	26	49	36	29	36
OVERWEIGHTS							
Total number	27	22	45	59	22	55	230
Percentage of entire class	19.7	13.5	13.9	13.9	10.4	21.1	15.1
Per cent							
Above av. age	18	18	26	20	19	17	22
Average age	26	23	33	27	36	36	30
Below av. age	56	49	41	53	45	47	48
Per cent							
Above av.intell	56	50	51	31	36	17	40
Av.intelligence	22	24	25	26	9	18	21
Below av.intell.	22	26	24	43	55	65	39
UNDERWEIGHTS							
Total number	10	37	35	112	29	53	276
Percentage of entire class	7.3	22.7	10.8	26.4	13.8	20.3	18.2
Per cent							
Above av. age	30	14	29	20	24	11	21
Average age	20	38	48	31	31	50	37
Below av. age	50	48	23	49	45	39	42
Per cent							
Above av.intell.	70	33	57	35	55	48	50
Av.intelligence	-	11	17	22	14	23	14
Below av.intell.	30	56	26	43	31	29	36

Conclusions

1. The age distributions for the three grades evidence clearly the graded increase in each year for the separate classes. This was not unexpected. While individuals would not seem to bear out this statement, a study of any group of Junior High School and Senior High School students would develop conditions such as found in the study of the group under consideration. The standard deviations of the classes vary little and evidence the same degree of deviation from the central tendency.

2. Striking are the percentages of overweights and underweights below the average age. This study was confined to groups and not to individuals; hence the cases involved in this connection were not studied individually. Unless the cause of these overweights and underweights is due to organic or biological factors, I venture that the physical training of these individuals has been neglected or the training received was not conducive to their betterment. Much has been done in corrective gymnastics. Athletes and pugilists in particular can be trained to take on weight or to reduce to proper form. Why could not this be applied to individuals such as these? In the elementary schools the pupils are weighed and measured regularly

and those of underweight are given directions as to food and in some cases milk is supplied. The capacity of our gymnasium is overtaxed owing to the crowded conditions prevailing in the schools and the teachers in charge are making the best of a condition beyond their control. In track events the students partaking are weighed and measured and their age ascertained; these three factors combined determine their classification into different groups. If this were done in classifying entrants to the gymnasium classes, greater value would accrue to the individual. The writer readily appreciates that this would be a huge administrative problem, for to classify according to ability or inclinations in the several departments would involve complications and conflicts that present problems impossible to solve, especially when two schools operate in the same building and have to use the same equipment.

3. Owing to the correlation of age and intelligence scores (to be discussed later) it is not surprising that the intelligence scores of these overweights and underweights should range higher than those of the average in the group. The younger members of the group show higher intelligence rating and this is natural, the same correlation prevailing for the entire class.

Since age is one of the important factors in the

determination of normal weight, and, as we shall see later, the correlation between age and intelligence scores is negatively low, it is logical that the overweights and underweights range below the average age and slightly above the average intelligence rating.

While the percentage of overweights and underweights of each group are considerable the actual numbers for each class are not large enough to arrive at definite conclusions. The facts in the case, however, are sufficient to arouse attention and should be a matter of concern for the school authorities.

4. The intelligence scores also show a gradual increase towards the higher classes. This is natural and was expected. The age-intelligence scores correlation of each group is negative but not very high. Students above the average in one group will not tend to be above the average in the other. The younger members usually, in the same class, rate higher in intelligence scores. It is certainly fallacious for parents to object to their children entering the high school before they have attained a certain age. In deciding a matter of this nature, it is well to consider the social and more particularly the well-being of the child. In the Bureau of Education Bulletin No.10, B.T.Baldwin in his report 'Physical Growth and School Progress' arrives anticipated by

W.T.Porter: "No child whose weight or height is below the average (median or norm) for its age should be permitted to enter a school grade beyond the average of its age except after such a physical examination as shall make it possible that the child's strength is equal to the strain."

5. Hence as a general conclusion I would say that chronologically and physically a moderate positive correlation prevails; but chronologically and mentally a slight but negative correlation obtains among the boys and girls of the Junior High School and the sophomore class of the Senior High School.

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